



MR Imaging of the Wrist and Hand

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MRI of the Wrist

- Occult fracture
- Ganglion Cyst
- Tumor
- Ligament tear
- Avascular necrosis
- Arthritis
- Tendon Pathology
- Nerve Impingement
- Infection

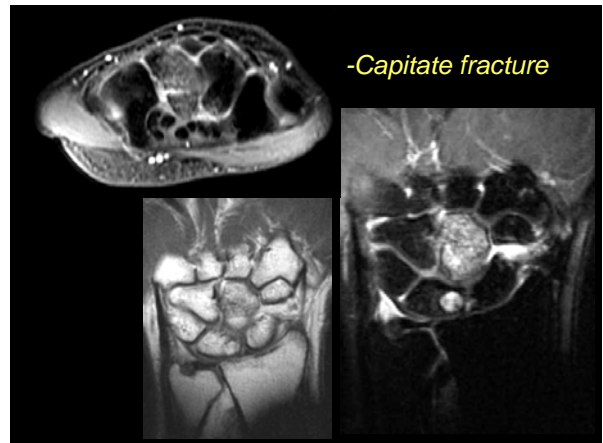
Occult fracture

-Not visible on initial radiographs

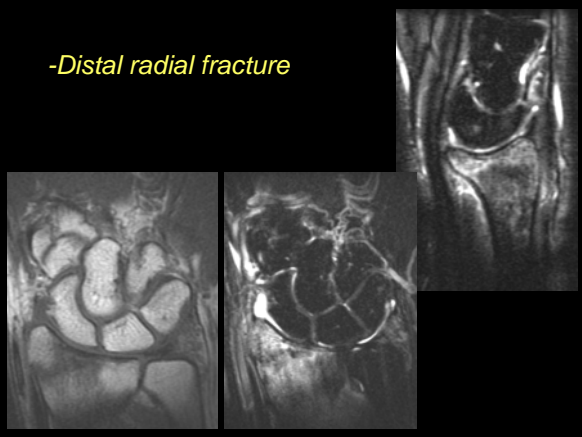
-follow-up xray, CT

-MRI:

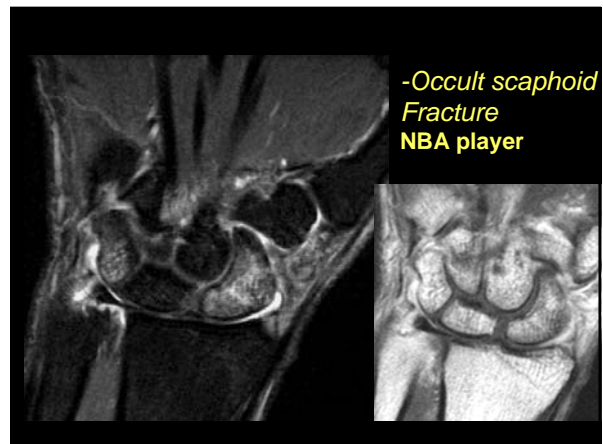
- MRI very sensitive for dx
- Use T2fs / STIR to detect
- Use T1 to DDx fx vs. bone bruise
- Determine extent of injury
- Osseous, soft tissue
- can dx alternate cause of pain



-Distal radial fracture



-Occult scaphoid Fracture NBA player

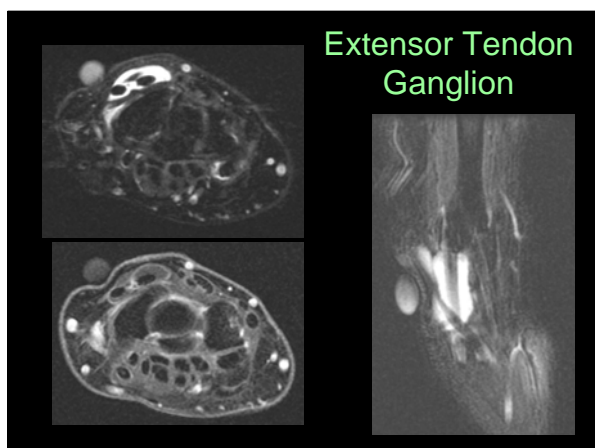
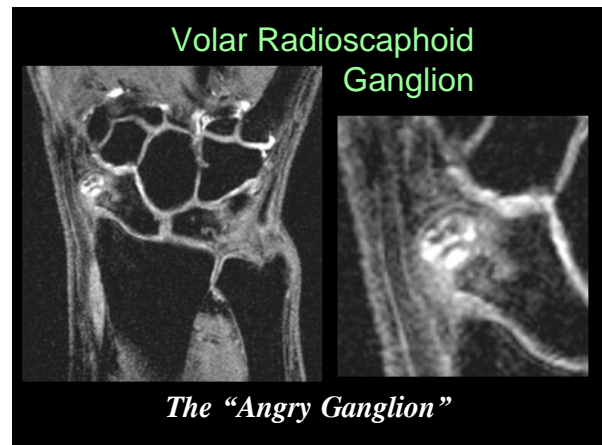
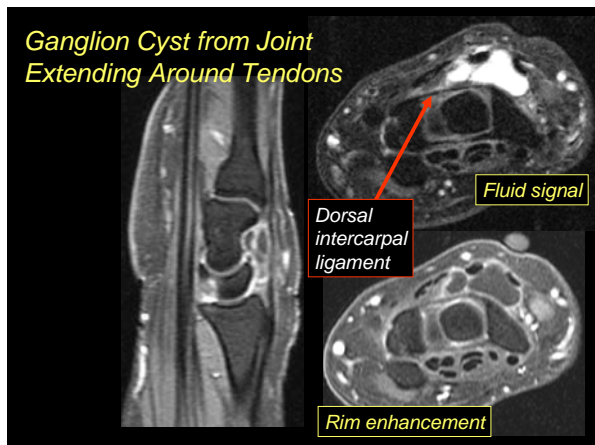


Ganglion Cyst

- Common at wrist, esp. dorsal
- May simulate mass, or may be occult source of pain if small or deep
- Joint >> tendon sheath
- MRI:
 - Lobulated
 - Fluid signal
 - Rim-enhancement
 - May indicate underlying ligament tear

Ganglia: Common Locations

- Dorsal
 - Deep to tendons
 - Adjacent to lunate/capitate joint
 - Weak area of capsule
 - Extends around dorsal intercarpal ligament
- Volar
 - Radial aspect off radioscaphoid joint
 - Adjacent to radial artery – may be confused for vessel / aneurysm
- Other areas
 - Into carpal tunnel
 - Off tendon sheaths

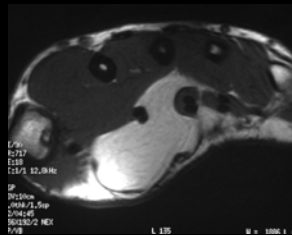


Tumor

- MRI may help DDx:
 - Malignant / benign lesion vs. ‘pseudomass’
- **Most soft tissue ‘masses’ are benign lesions with characteristic MRI features**
 - Lipomas
 - Ganglion cysts
 - Hemangiomas / vascular malformations
 - Giant cell tumor of tendon sheath
- **Osseous lesions**
 - Radiographs important for DDx
 - MRI: solid vs. cystic (esp w contrast)

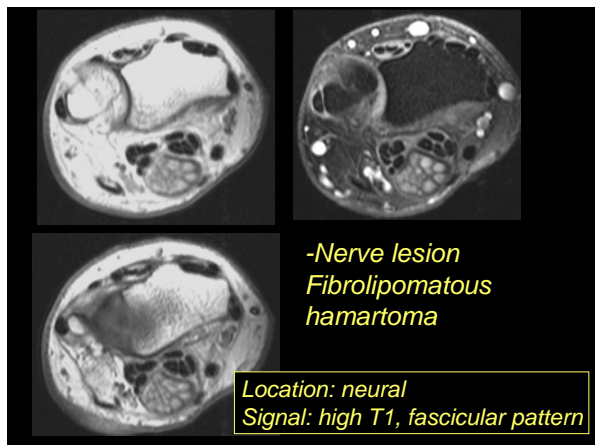
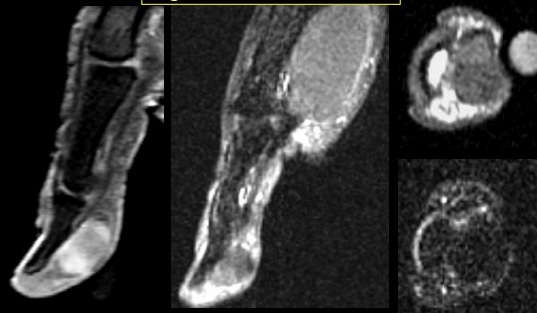
-Lipoma

Fat signal
No internal complexity



-Giant cell tumor of tendon sheath (GCTTS)

Location: tendon sheath
Signal: low T1, T2

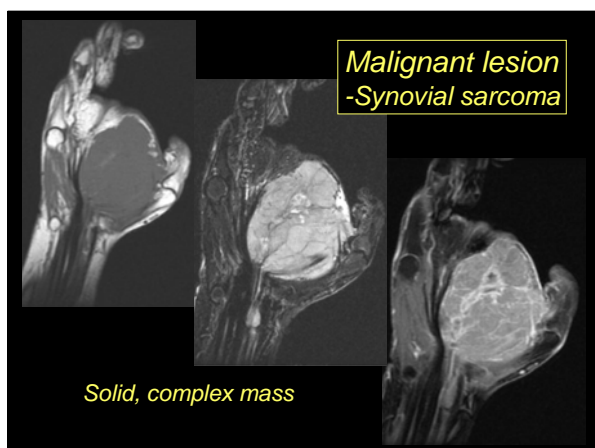
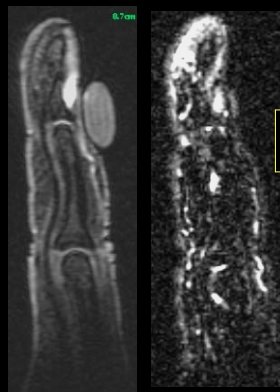


-Nerve lesion
Fibrolipomatous
hamartoma

Location: neural
Signal: high T1, fascicular pattern

-Glomus tumor

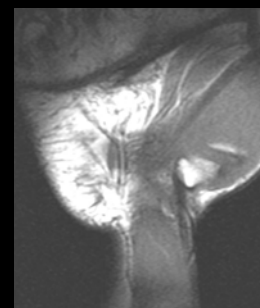
Location: distal digit
Signal: 'light bulb' on T2, Gd



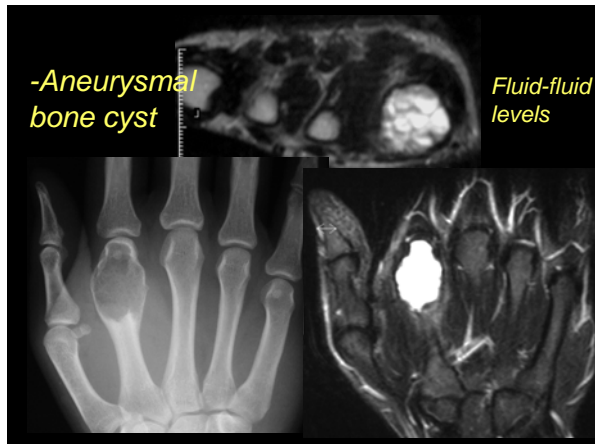
Malignant lesion
-Synovial sarcoma

Solid, complex mass

"Pseudomass" -Accessory muscle



Characteristic locations
e.g., palmaris longus
Signal: same as muscle



Ligament tear

-Intrinsic ligaments

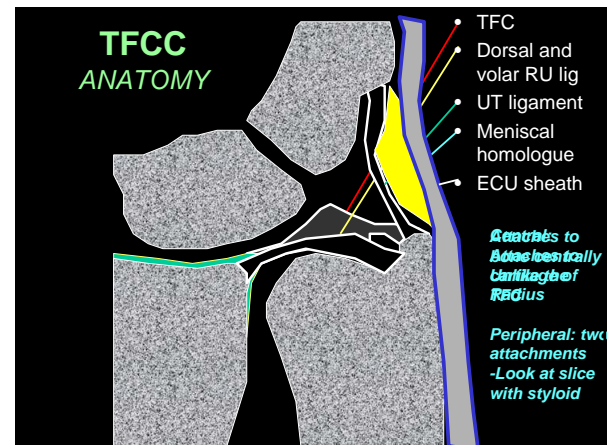
- Scapholunate
- Lunatotriquetral
- Triangular fibrocartilage complex
 - central (radial aspect)
 - peripheral (ulnar side)

-MR arthrography

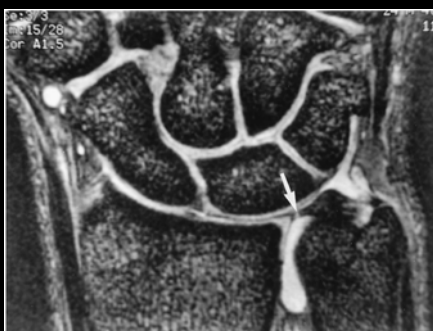
- Increases accuracy for dx of tear

Triangular Fibrocartilage "Complex" (TFCC) Anatomy

- Triangular fibrocartilage
- Dorsal and volar radioulnar ligaments
- Ulnar-triquetral ligament
- Meniscal homologue
- ECU sheath



TFCC - perforation



Perforations may not be clinically significant

Central TFCC Tear



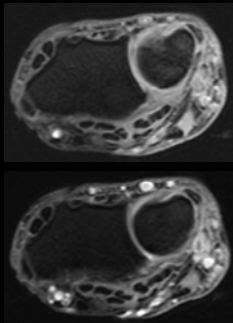
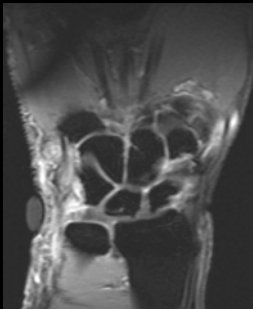
-Peripheral TFCC tear



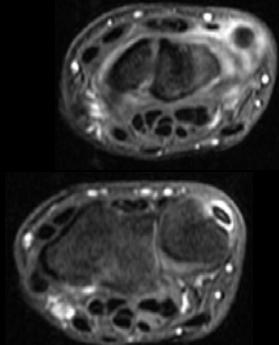
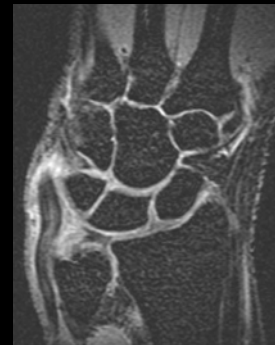
Peripheral TFCC Tear / LT Tear



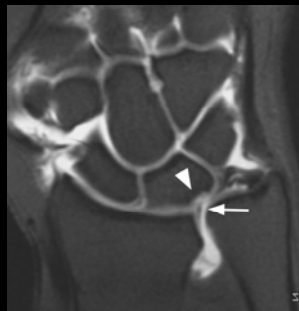
ECU Subluxation / Peripheral TFCC Tear



ECU Tenosynovitis / Peripheral TFCC Tear



Ulnar-lunate Abutment



Indirect Arthrogram – tear of central TFC with ulnar-lunate abutment



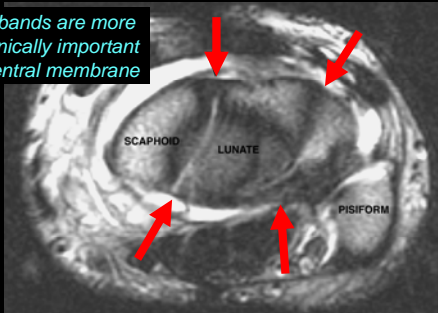
-Positive ulnar variance

-Cystic change in lunate

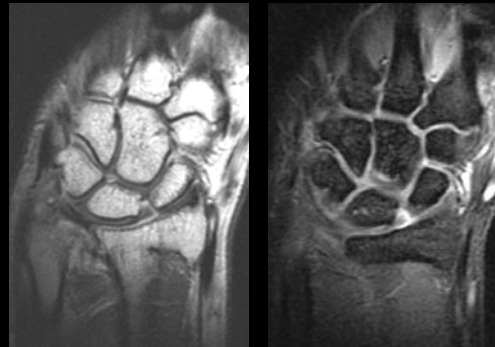
-TFCC tear

Scapholunate and Lunatotriquetral Ligaments DORSAL AND VOLAR BANDS

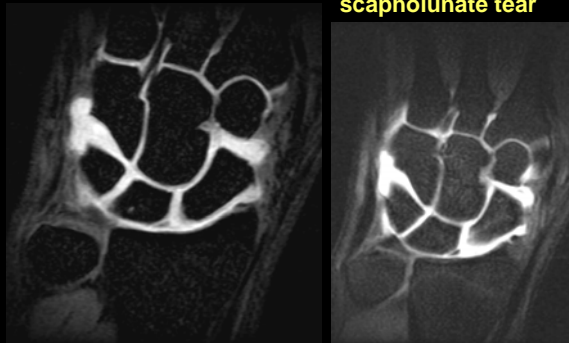
These bands are more mechanically important than central membrane



Scapholunate Ligament Tear



Direct MR arthrogram – scapholunate tear



SL or LT tear
can cause carpal
malalignment

Dorsal tilt of lunate
(DISI deformity)

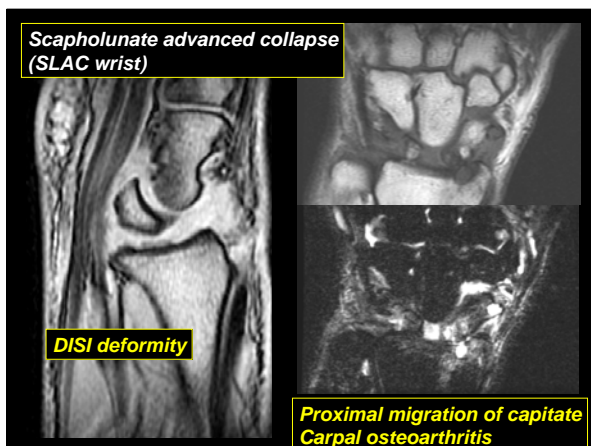


Scapholunate tear
Palmarflexion of scaphoid

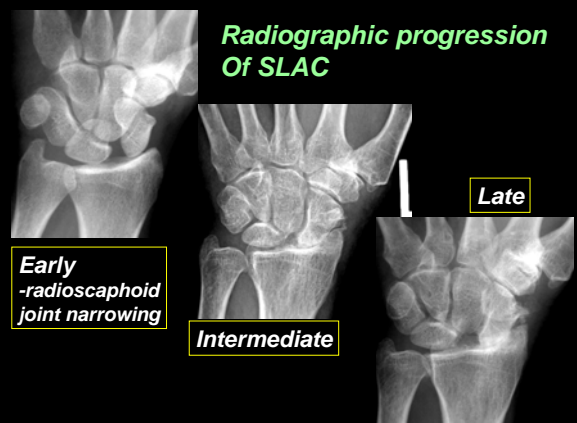
Scapholunate advanced collapse
(SLAC wrist)

DISI deformity

Proximal migration of capitate
Carpal osteoarthritis



Radiographic progression Of SLAC

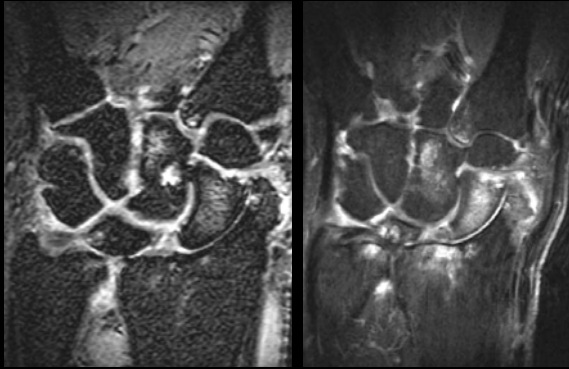


Early
-radioscaphoid
joint narrowing

Intermediate

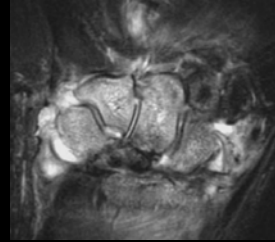
Late

SLAC wrist



SLAC secondary to rheumatoid arthritis

Inflammatory arthropathies can cause intrinsic ligament tears



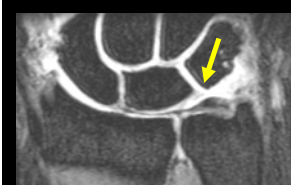
Extensive synovitis
Marrow edema



Lunatotriquetral Ligament Tear



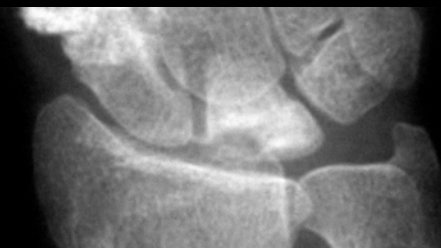
Lunatotriquetral ligament tear



Lunate may tilt in palmar direction along with scaphoid (VISI)

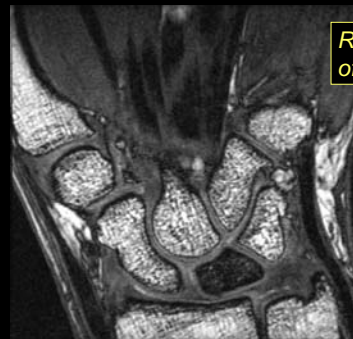


Avascular necrosis



-Lunate (negative ulnar variance)
-Scaphoid (fracture)
Progression: density, fracture, collapse, OA

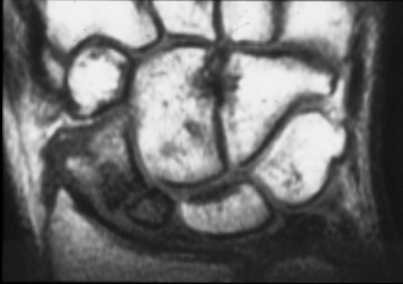
-Kienbock's disease



Replacement of fat signal c/w AVN



-Scaphoid fracture with AVN of the proximal pole



"SNAC" Wrist

Scaphoid Nonunion Advanced Collapse



*-Scaphoid nonunion
-Humpback deformity
-Acts like an SL lig tear
-Radiocarpal OA
... and AVN lunate*



Arthritis

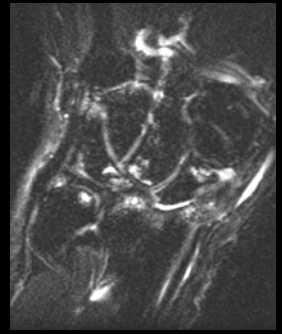
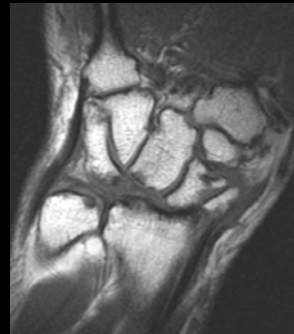
-Osteoarthritis

- Subchondral cysts cartilage loss, spurs
- Distribution depends on etiology
- Trauma, instability, predisposing factors

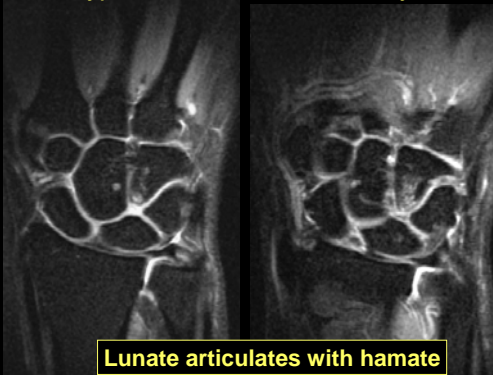
-Inflammatory arthropathies

- Classic: rheumatoid arthritis
 - Carpus, MCPs
 - Diffuse involvement
 - Synovitis, erosions

-Scapholunate Advanced Collapse (SLAC)



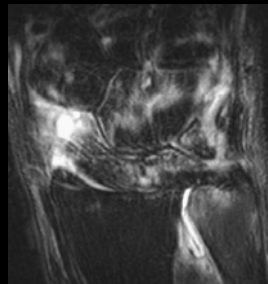
-Type 2 lunate with secondary OA



Lunate articulates with hamate

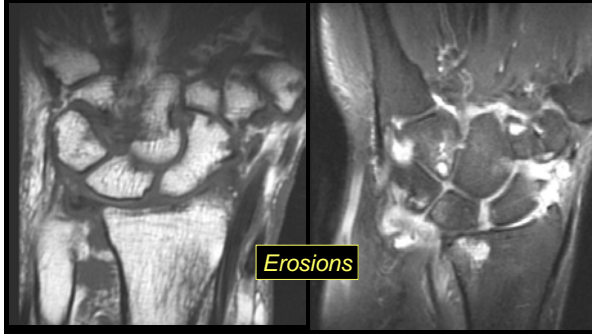
Rheumatoid Arthritis

Marked synovial proliferation



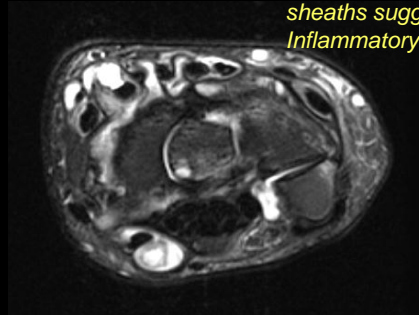
Rheumatoid Arthritis

MRI can monitor activity, response to Tx



Rheumatoid Arthritis

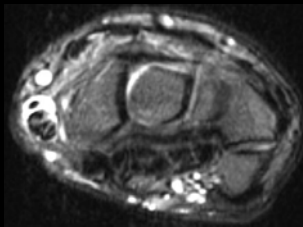
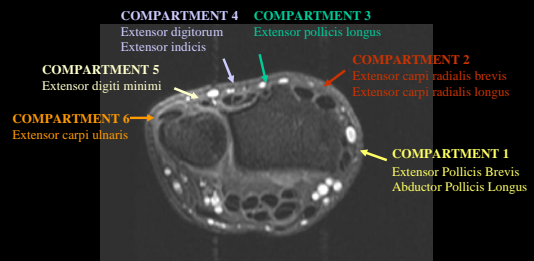
Tenosynovitis in multiple sheaths suggests an Inflammatory arthropathy



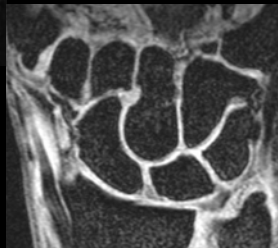
Tendon Pathology

- Tenosynovitis
- Tendon tear
- Pulley lesions

Extensor Tendons

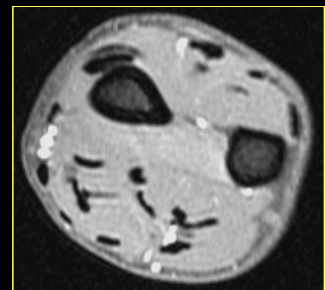


DeQuervain's Tenosynovitis
1st EXTENSOR COMPARTMENT

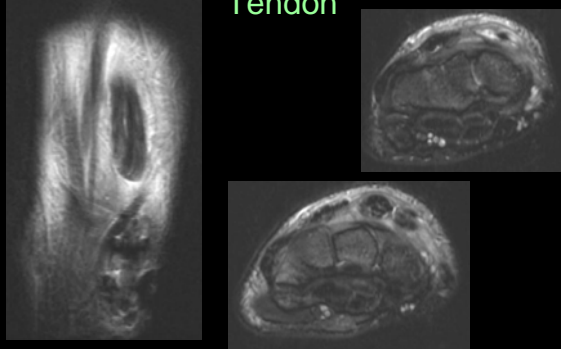


Inflammation at distal forearm at crossing point of first and second extensor compartments

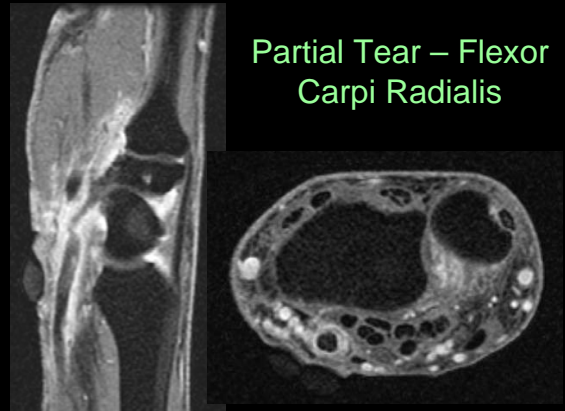
Intersection syndrome



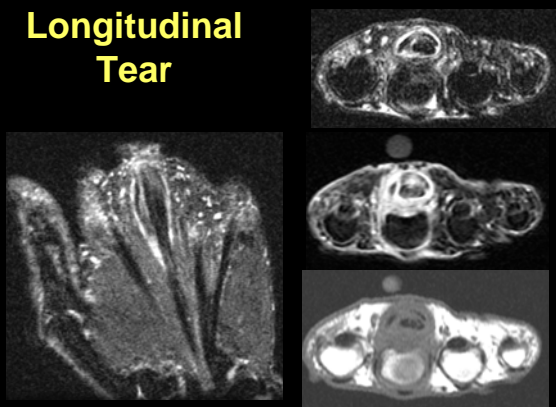
Complete Tear – Extensor Tendon



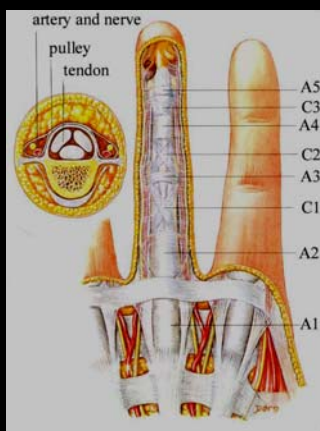
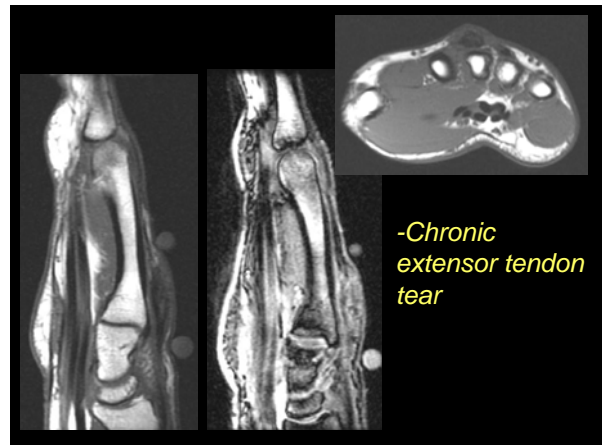
Partial Tear – Flexor Carpi Radialis



Longitudinal Tear



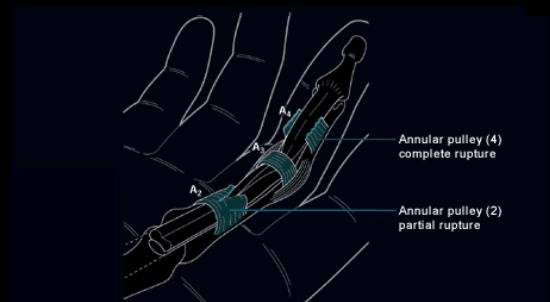
-Chronic
extensor tendon
tear



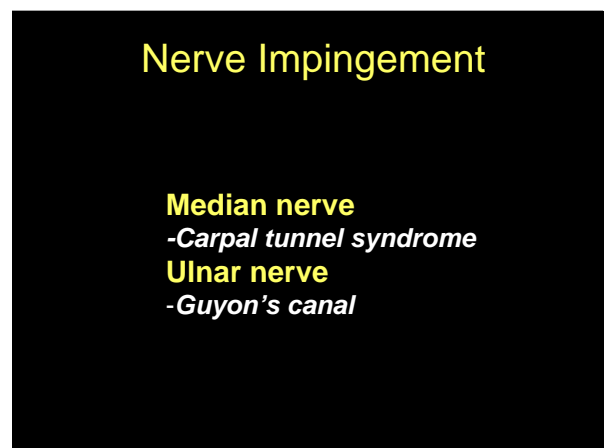
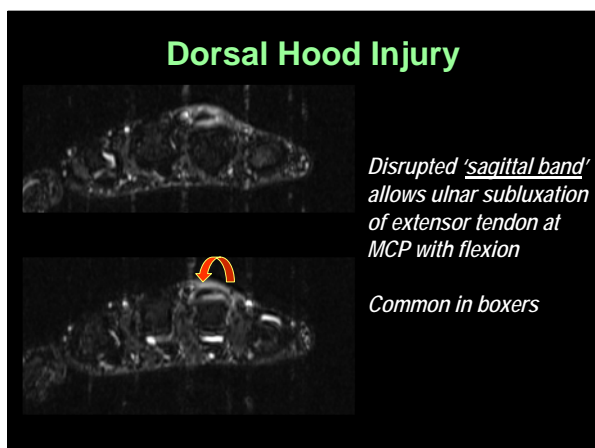
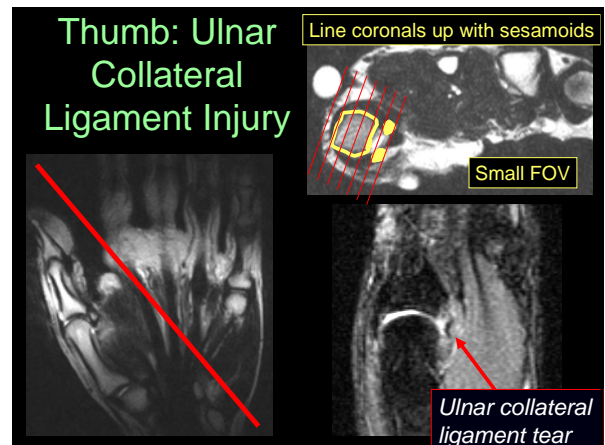
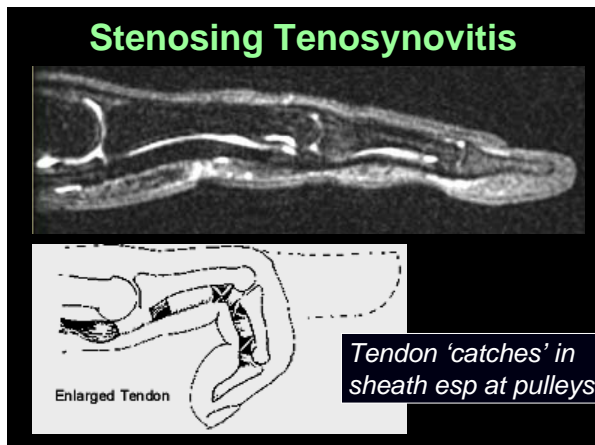
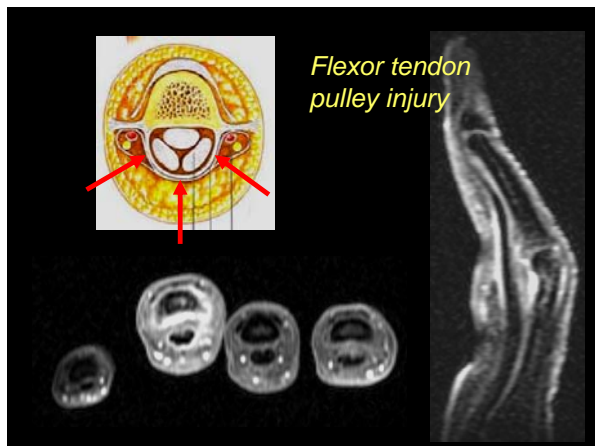
Pulley Injuries

A series of pulleys surround the flexor tendons keeping them apposed to bone

Tear due to chronic overuse, esp in rock climbers

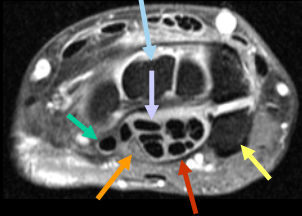


A2 and A4 pulleys are most commonly injured



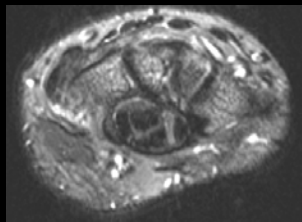
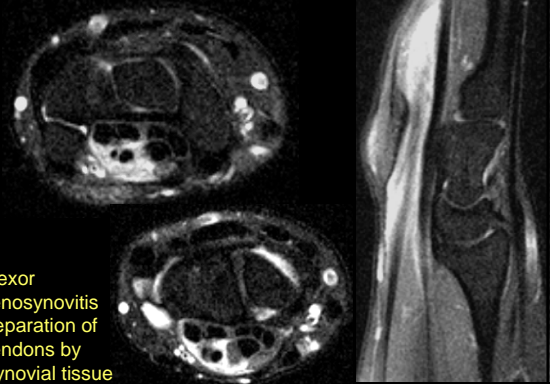
Carpal Tunnel

- Pisiform / hamate medially
- Carpal bones dorsal
- Flexor retinaculum volar
- Median nerve deep to retinaculum
- Flexor tendons
- Flexor carpi radialis: outside the carpal tunnel

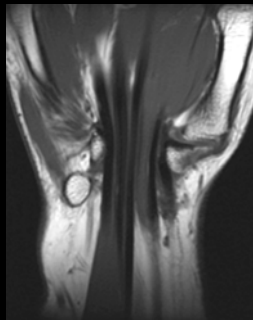


Carpal tunnel syndrome

- Flexor tenosynovitis
- Separation of tendons by synovial tissue



-Mass effect from muscle in carpal tunnel



CTS: Flexor Retinaculum Bowing

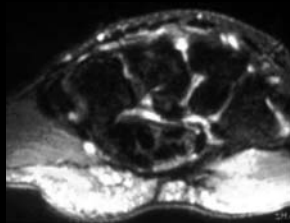


CTS: Proximal Enlargement and Fasciculation

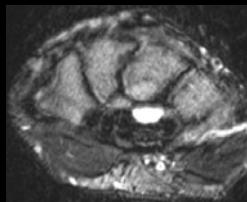
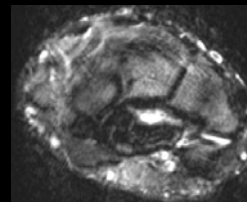
Fasciculation:
Looks like dots inside



proximal



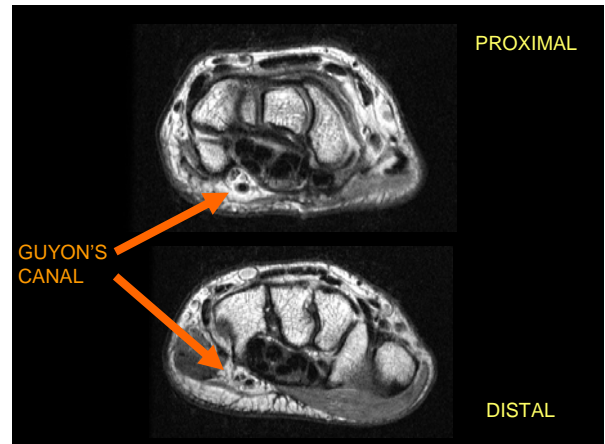
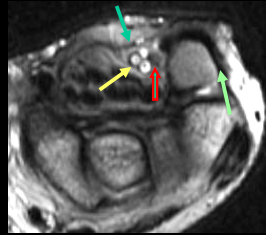
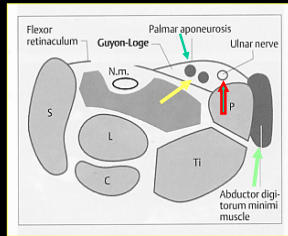
distal



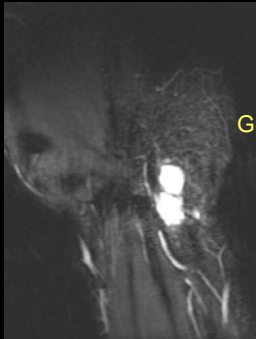
-Volar ganglion cyst in carpal tunnel



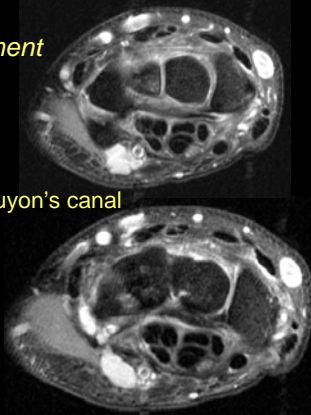
Guyon's Canal



*-Ganglion cyst with
Ulnar nerve impingement*



Guyon's canal



Infection

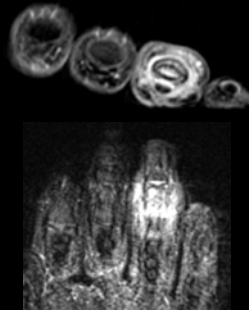
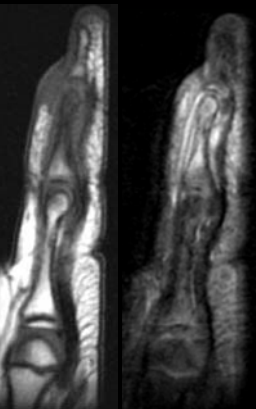
-Septic arthritis

Joint effusion
Synovial thickening / enhancement
Subchondral edema

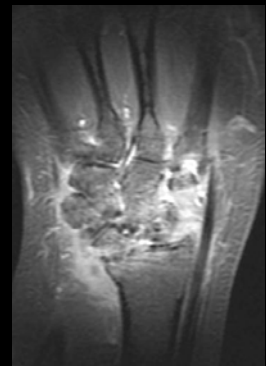
-Osteomyelitis

Marrow edema / enhancement

*-Septic arthritis
and osteomyelitis*



Septic arthritis and osteomyelitis



Routine MRI wrist:

- Tendon pathology
- Carpal tunnel syndrome
- Ganglion cyst
- Acute trauma
- Osteoarthritis
- AVN

MRI wrist with IV contrast:

- Mass
- Infection
- Inflammatory arthropathy

MR arthrogram:

- Ligament tear

MRI Protocol

THANK YOU